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ABSTRACT

Screen design, as an inherent part of the interface within computer-based instructional programs, is a critical component to the communication potential of the medium. This paper establishes aesthetics as an essential and necessary component of screen design and of instructional design. Current screen design guidelines tend to overlook the aesthetic. Effective screen design attempts to promote communication for the learner and program design that pays attention to the aesthetic of the screen design may prove to facilitate learning by intensifying this communication. In order to incorporate the aesthetic design of computer screens into the research process, the ideas of aesthetics need to be explored in the instructional design field and common definitions identified. The commercial arts field offers guidance to instructional design professionals in defining graphic arts principles which embody aesthetic quality. (Contains 13 references.) (JLB)

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Aesthetics and Screen Design: An Integration of Principles

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Introduction

Screen design, as an inherent part of the interface within computer-based instructional programs, is a critical component to the communication potential of the medium. Referred to as the purposeful organization of presentation stimuli in order to influence how students process information, screen design produces some cognitive benefit in the student's ability to perceive, organize and integrate information (Hannafin & Hooper, 1989). The visual design of the computer screen has been examined in the literature through various approaches including establishment of guidelines (Milheim & Lavix, 1992), calls for a visual design dimension or aesthetic education within instructional design (Abed, 1989; Martin, 1986) and various empirical research studies (Grabinger, 1989; 1992; Morrison et al. 1989; Aspillaga, 1991).

Guidelines generalized from studies and reviews related to screen design offer specific recommendations as to color, placement and use of elements on the computer screen. Research related to this area identifies and tests variables or combinations of variables related to the design of computer screens and typically compares them with dependent measures of learner achievement or preference. Although the resulting guidelines are useful to the instructional designer, they often do not address the overall visual dimension of the computer screen. The overall visual dimension of the computer screen in an instructional program refers to the integration of individual visual elements that combine to produce the aesthetic of the screen. Aesthetics of the computer screen within instructional programs have been contemplated by at least one instructional designer in her appeal to add the dimension of the aesthetic to traditional cognitive, psychomotor and affective goals of instructional design (Martin, 1986). This paper attempts to further that appeal by establishing aesthetics as an essential and necessary component of screen design and, therefore, of instructional design itself.

Screen Design Guidelines

Hannafin and Hooper (1989) state that effective screen design causes learners to develop and maintain interest in lesson content and promotes the engagement of the learner with the material and facilitates deep processing of important information. The quality of the design of elements on screen may lead to improved performance by sustaining the interest of the viewer (Faiola & DeBloois, 1988). Screen design, therefore, has a crucial role in the delivery of information to the learner.

Various sources for screen design guidelines exist to direct the instructional designer. (Strickland & Poe, 1989; Ng, 1986; Milheim & Lavix, 1992). Many present a list of recommendations that attempt to simplify the visual design process by suggesting appropriate use and placement of graphical and textual elements. Often these recommendations also include specific guidance as to what

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combination of design elements to avoid. These guidelines, however, are deliberately simplified and free of context in order to transfer to multiple screen design situations.

While potentially valuable to the beginning designer, these recommendations are finite and formulaic in their approach to the design of computer screens. Typically, these guidelines address individual elements of screen design such as text, graphics, and navigational tools. Attributes of these elements are also addressed and can include color, highlight, number, or placement. Yet the integration and holistic perspective of these elements and their attributes apparent in visually complex screens is rarely approached in the current literature. The combination of these elements to create an overall design, look, or aesthetic is one not typically addressed.

The role of screen design as the communicative mechanism between the learner and the instructional program demands that the attention be focused not only on the specific elements and their attributes, but also on the aesthetic appeal of the various elements combined.

Screen Design Research

The research base associated with screen design has begun to address multiple combinations of elements of the screen rather than individual variables. The focus of several studies has concentrated on typographical factors. Attributes such as the use of text in headings, directive cues, line spacing (Grabinger, 1992) text density (Morrison et. al. 1989) or location of text and graphics (Aspillaga, 1991) have been examined. Obstacles inherent in this particular research thrust is documented by Grabinger (1989, p.2) who states:

> The number of text elements or variables used in both paper and electronic publishing is quite large. When combined, the number of variables and interactions are so great that two significant research problems arise. First, research into each possible combination of variables becomes a daunting proposition. Second, it is possible that in any particular design the contribution of each element or variable to the overall meaning of the display is quite small.

Grabinger's observations of the problems in screen design research investigating textual factors may be generalizable to various other combinations of visual elements on the screen. It seems there are an infinite number of individual variables to consider in regard to visual elements that makeup a computer screen. Isolating a single variable in an attempt to associate it with an increase in learning is difficult, if not impossible. Grabinger (1989) has proposed a solution to this problem with the categorization of screen design elements in order to simplify the research process. This classification scheme, based on viewers' evaluations of screens, grouped a variety of individual textual variables into three categories: organization, structure and simple. These classifications are his attempt to organize the visual elements or variables more cohesively within the screen design implicit in his studies.

Perhaps this type of classification method will circumvent some of the problems ingrained in screen design research methodology; however, an additional benefit may also become apparent. The shift of focus from the effect of individual screen design variables to more comprehensive categories of various visual elements, as represented by Grabinger, may encourage designers and researchers to rethink the traditional approach to screen design. Grabinger (1989) justifies this approach by stating that individual [text] elements contribute to the "whole" image or screen and that it is the overall combination of elements that makes an impact on the viewer.

Research in this area, perhaps needs to concentrate on the integration and combination of various visual elements on the screen in order to produce practical recommendations in the design of visually complex screens. This research direction represents an aesthetic approach to screen design.

Aesthetics, Visual Design and Learning

A computer-based instructional screen involves various elements and attributes which combine to create an aesthetically pleasing and appropriately functional program. Visual design is defined by Abed (1989) as "the organization of materials and forms in such a way as to fulfill a specific purpose." Visual design should direct the learner to an action or purpose (Abed, 1989). The overall purpose of screen design, in assisting the learner in his or her processing of information, is congruent with the definition of visual design.

Effective screen design attempts to promote communication between the student and the program in order to cultivate learning. The visual organization or design of screens may have an impact on cognitive learning through aesthetically superior programs. Program design with attention paid to the overall aesthetic of the screens may prove to facilitate communication by capturing, holding and focusing the learner's attention on the content (Martin, 1986).

However, a need exists for empirical studies to confirm the inference that aesthetic screen design could facilitate learning. The difficulty of testing an obscure, often subjective feature such as aesthetic design, by its nature, proves to be problematic. Also, aesthetic or visual design of screens cannot be isolated; it must be considered within the other functional and instructional goals of the program. Conversely, caution should be taken with a design approach that focuses only on aesthetics, making it a priority over the interaction between the program and learner. This approach may detract from the communication of the message (Grabinger, 1992). The aesthetic aspect of computer screens must coincide with the instructional design goals of the program in order to ensure effective delivery of the information. Just as form and function go hand in hand so, too, must instructional design and aesthetic design. They are inextricably connected.

Aesthetics and Instructional Design

As Martin and Briggs (1986) maintain, historically within the instructional design field, the aesthetic dimension of media has largely been overlooked. One reason stated for this oversight is the incompatibility of aesthetics with a behavioral orientation. Abed (1989) supports this claim by stating that a perception exists that aesthetic or visual design cannot play a crucial role in the systematic and "predictable" nature of the instructional development process. Yet many experimental researchers and practitioners continue to explore the area of screen design. They continually search for conclusive results and guidelines that will improve designer's approach to the interface in the hope to ultimately associate a particular screen design variable or variables with evidence of improvement in learning.

Guidelines exist outside of the instructional design field which can help instructional designers effectly implement visual elements into screen design. These visual recommendations have been time tested in the art world and are referred to as graphic arts principles. Several professionals in the instructional design field have made attempts to recognize the importance of the inclusion of artistic or aesthetic principles within the design of computer-based instruction (e.g., Martin 1986; Abed 1989; Reilly & Roach,1986). There is agreement among these authors that aesthetics is an important consideration within instructional design. Aesthetics is not only important, it is

necessary for effective visual communication. Much of the existing screen design research findings can be subsumed under the general aesthetic arts principles originating in the graphic arts field.

Overlap of Graphics Arts, Human Factors, and Screen Design Principles

Reilly & Roach (1986) integrated principles and research from both the graphics arts and human factors fields. They highlighted the commonality between artistic principles and research results associated with the human factors field. Many conclusions from human factors research could be grouped under categories of the artistic principles of proportion, sequence, emphasis, unity, and balance (Reilly & Roach, 1986). Individual variables explored included such elements as color, arrangement, placement, order and display. The elements and their attributes corresponded heavily with many of the specific graphic arts principles.

Interestingly, when screen design research results and guidelines within the instructional design field were incorporated into this framework, the majority of these recommendations could be grouped within the graphic arts categories as well. This suggests that many of the individual experimental variables associated with screen design may be inherent in graphic arts principles. It also would seem to suggest that since individual elements of screen design have been tested and accepted, the research focus should move toward a broader visual approach. The aesthetic design of computer screens should be considered in the research process and practical application of this area. In order to accomplish this however, the idea of aesthetics must be explored thoroughly within the instructional design field and common definitions needs to be identified. In the following conclusion of this paper suggestions are made to help facilitate this proposition.

Aesthetics and Instructional Design

Martin (1986) states that aesthetics are concerned with feelings and sensory experiences. In her view all art forms share similarities and differences and that these commonalties are of utmost importance. In this vein, computer-based instruction could be viewed as an elementary art form, not yet fully matured but continually establishing its own visual identity. In order to fulfill its primary function, promoting learning, programs need most importantly to engage the viewer. An appealing environment which adheres to aesthetic principles may do much to enhance the learning experience. The visual aspect may draw the viewer in, as an intuitive invitation. It may communicate the content, as well as impart an affective or feeling perspective twhich together may initiate or assist the viewer's learning. It is theorized that the addition of the aesthetic realm to the instructional domain can only enhance the learning experience of computer-based instruction.

Aesthetic quality exists in many created objects and fields of study. Martin (1986), in her appeal to include aesthetics in the training of educational technologists, suggests the incorporation of rich, varied and extensive experiences with a number of art forms. While this certainly would improve artistic sense and aesthetic appreciation of beginning and practiced instructional designers, perhaps it would be beneficial to concentrate on a single related field to encourage transfer of aesthetic concepts.

The field of commercial art lends itself well to the design of computer-based instruction. Many visual aspects can be translated easily from the commercial art field to computer-based instructional design, including the use of fonts, placement of photographs in regard to text, the use of color for attention and the

overall goal to entice the viewer and produce an emotional response.

Perhaps because of commercial art's visual qualities and use of aesthetics, it is a field that instructional designers could look toward for guidance in aesthetic design. How well the visual ideas transfer from this medium to computer-based instruction remains to be explored; however, the commonalties of textual, graphical and color elements in both mediums creates a potential shared base of information. Inspiration for design may also possibly be gleaned from award-winning children's book illustrations, sophisticated magazine layouts and effective print advertisements, for example.

This paper has attempted to review screen design research and guidelines present in the instructional design field and propose a broader perspective in regard to the examination of visual elements on the computer screen. Past research has concentrated on individual variables while more recent studies have begun to categorize these variables into larger visual components. The overall aesthetic of the computer screen represents an important instructional element that remains to be empirically investigated.

The commercial arts field offers guidance to instructional design professionals and researchers in defining graphics arts principles which embody aesthetic quality. However, these arts principles should be defined and considered within the instructional design field as to their potential contribution to learning. Implementing artistic principles to improve the aesthetic appeal of screens may offer a more holistic and comprehensive method of testing the impact of screen design on learners. This approach may prove a better method of investigation in this area than prior studies examining individual variables.

Much work needs to be done in this area. Issues remain concerning the creation of a common definition of aesthetics, how aesthetic principles can be properly implemented into the instructional design process, and methods to empirically validate them. This paper is an exploratory attempt to open the dialogue of research and discussion in this area in order to stimulate further thought concerning the present and potential future nature of screen design practice and research.

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